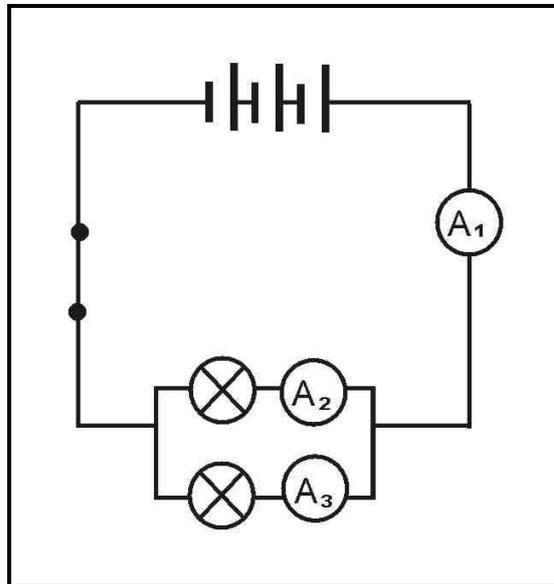


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QUESTION 1

There are four possible options for each answer in the following questions. Each question has only ONE correct answer. Choose the correct answer and write only A, B, C or D next to the question number.

1.1 Consider the following diagram of a circuit. The light bulbs are not necessarily identical.



The reading on A₂ will be equal to:

- A the reading on A₁
- B half the reading on A₁
- C the reading on A₃ minus the reading on A₁
- D the reading on A₁ minus the reading on A₃. (2)

1.2 When a chemical change occurs:

- A there is no change in mass, in the number of atoms or in the number of molecules
- B there is no change in mass or the number of atoms, but there is a change in the number of molecules
- C there is no change in mass, but the number of molecules and the number of atoms change
- D the mass, number of atoms and number of molecules all change. (2)

- 1.3 The temperature of a substance depends on:
- A only the number of molecules
 - B the density of a substance
 - C the kinetic energy of the molecules
 - D forces of attraction between the molecules. (2)
- 1.4 Eshed has a mixture of sand and water. The best method to separate this solution would be:
- A fractional distillation
 - B separating funnel
 - C filtration
 - D centrifuge. (2)
- 1.5 A compound consists of ions X^{2+} and Y^{3-} . A possible formula for the compound could be:
- A $3X_2Y$
 - B X_2Y_3
 - C X_3Y_2
 - D $(XY)_6$ (2)
- 1.6 Which of the following is not a characteristic of a physical change:
- A no new products are formed
 - B changes can be reversed
 - C observable with the naked eye
 - D the parts of the substance lose their chemical identity (2)
- 1.7 The heat involved when water changes to steam is called the:
- A latent heat of melting
 - B latent heat of vaporisation
 - C latent heat of sublimation
 - D latent heat of evaporation. (2)

[14]

QUESTION 2

Give one word or term for each of the following descriptions. Write only the word or term next to the question number.

- 2.1 A group of gases that occur as single atoms in nature. (1)
- 2.2 A substance that can be broken down into simpler parts. (1)
- 2.3 The type of bond between metals and non-metals. (1)
- 2.4 A measure of how much charge is passing a certain point in a circuit in a given amount of time. (1)
- 2.5 The apparatus used to measure the potential difference across a resistor. (1)
- 2.6 A substance that cannot be broken down into simpler parts. (1)

[6]

QUESTION 3

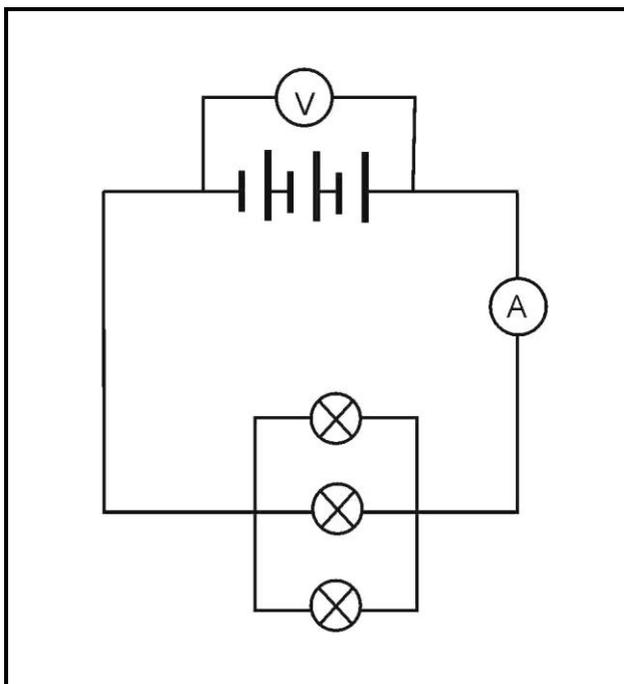
Many South Africans have access to electricity in their homes via the national grid. All new houses that have been built have had pre-paid electricity meters installed in them. The owner of the house purchases electricity using an electricity card at a shop, very similar to the way one purchases airtime for your cellphone.

- 3.1 Name one ADVANTAGE and one DISADVANTAGE of the prepaid electricity system. (4)
- 3.2 What is the social/economic impact of having electricity available in every household in South Africa? (3)

[7]

QUESTION 4

Consider the circuit below: The bulbs are identical. The resistance of the battery, ammeter and connecting wires can be ignored.



- 4.1 Calculate the voltage of all three cells if they can transfer 90 J of energy to 20 C of charge. (4)
- 4.2 What would the potential difference of each cell be? (2)
- 4.3 A charge of 30 C of charge passes a point in the main circuit in 40 s. Determine the strength of current passing through the main circuit. (4)
- 4.4 Determine the current through each individual light bulb. (2)
- 4.5 If one of the light bulbs burns out, how would the brightness of the other two bulbs be affected? Write only SHINE BRIGHTER/SHINE DIMMER. (1)

[13]

QUESTION 5

Consider the following household items:

- fizzy drink (e.g. cola)
- sugar crystals
- salt solution
- graphite for a clutch pencil
- vinegar
- iron paper clips
- bicarbonate of soda
- air
- dishwashing liquid
- granite counter top

5.1 From the list of items above, write down:

- a) TWO homogeneous mixtures (2)
- b) TWO heterogeneous mixtures (2)
- c) TWO compounds (2)
- d) TWO elements. (2)

5.2 Provide the chemical name for bicarbonate of soda. (2)

[10]

QUESTION 6

To measure the solubility of a substance you need to find out the maximum amount of substance that can dissolve in a given amount of water at a CONSTANT TEMPERATURE. The solubility of a substance is written in g (of solid)/100 cm³ of water.

Jessie and Misha would like to investigate and compare the solubility of table salt to that of copper sulphate at room temperature.

- 6.1 What is the chemical formula for table salt? (2)
- 6.2 What type of bond exists between particles of table salt? (1)
- 6.3 Plan a suitable experiment that they could follow to investigate and compare the solubility of these two substances. (5)
- 6.4 Suggest a suitable hypothesis for this investigation. (2)
- 6.5 It is necessary to keep the temperature of the room constant during the course of the investigation. How will your results differ if the temperature of the room was raised by 10 °C during the course of the experiment? Give a reason for your answer. (4)
- 6.6 What is the chemical formula for copper sulphate? (2)

[16]

QUESTION 7

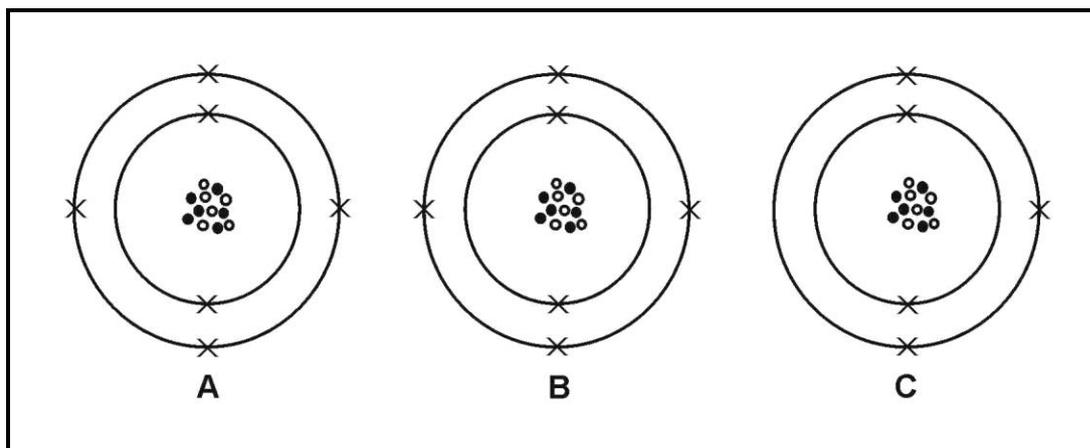
Copy the periodic table below into your answer book. Use the clues to place the elements in their correct positions in the table. Imaginary symbols have been allocated to the elements and these must be used when completing the table.

- 7.1 Q is the inert gas in period 3. (1)
- 7.2 R is the element in period 2 that has 7 valence electrons. (1)
- 7.3 T is the element with the smallest atomic radius. (1)
- 7.4 V is the element in period 2 that forms the V^{2-} ion. (1)
- 7.5 Y is the element in period 2 that combines with V to form the compound VZ_2 . (1)
- 7.6 Z is the element in period 3 that burns with a yellow-orange flame when it occurs as a cation. (1)
- 7.7 M is the element in Group 2 that has electrons in two energy levels. (1)
- 7.8 W is the element in period 3 that is a semi-metal used in electronics. (1)
- 7.9 X is the element with the electronic structure of $1s^22s^22p^1$. (1)

[9]

QUESTION 8

Consider the diagrams below showing three different neutral atoms A, B and C.

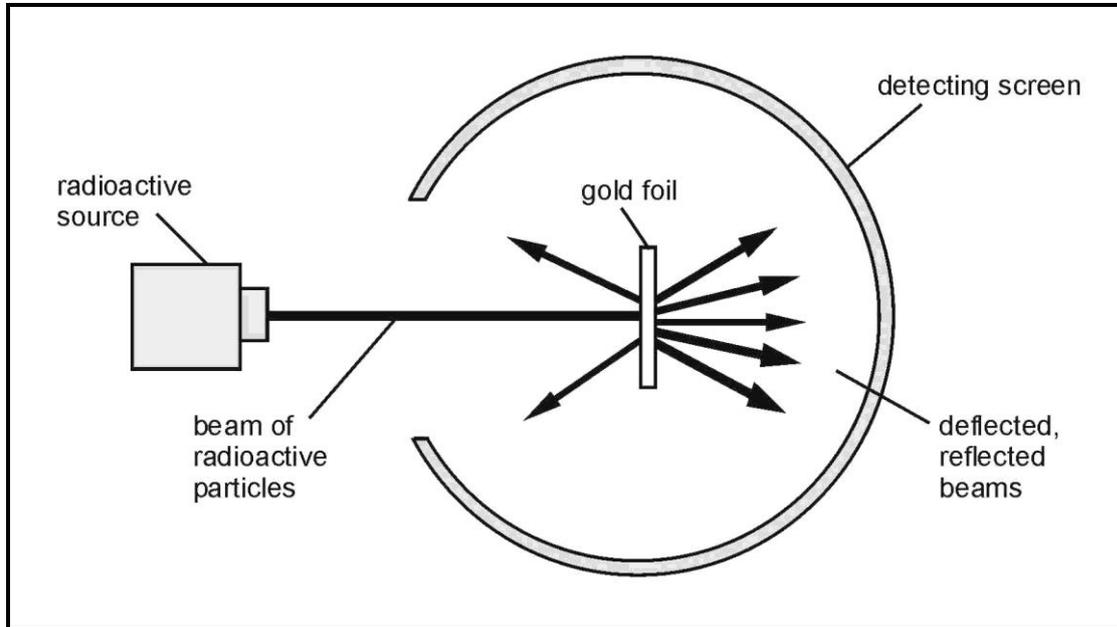


- 8.1 What is the name given to the collection of particles at the centre of the atom? (1)
- 8.2 What are the particles represented by the crosses on the diagram? (1)
- 8.3 Which two atoms are isotopes of the same element? Give a reason for your answer. (4)
- 8.4 Which element does atom A. (2)
- 8.5 Which type of particle in an atom has a negative charge? (1)
- 8.6 Explain what occurs when an atom becomes a negative ion. (3)

[12]

QUESTION 9

In 1910, Ernest Rutherford directed positively charged radioactive particles into a thin sheet of gold to investigate what atoms were made of. He expected many of the particles to be deflected backwards, but noted that most of the particles passed straight through the sheet of gold, while only a few were deflected and bounced back. These results led to the further development of the atomic model.



- 9.1 Describe the model of the atom that the scientists believed was true before this experiment. (3)
- 9.2 Why did most of the particles pass straight through the thin sheet of gold? (2)
- 9.3 What caused some of the particles to be deflected? (2)
- 9.4 The results of this experiment led scientists to revise the structure of the atom. Refer to THREE aspects of the atom to describe how the model was revised. (3)
- 9.5 Use the scientific method to explain how this experiment helped scientists develop a better understanding of the atom. (3)

[13]

[TOTAL: 100 marks]